

**OREGON DEQ'S RECOMMENDED FORMAT,  
REMEDIAL INVESTIGATION/FEASIBILITY STUDY  
SCOPE OF WORK (SHORT VERSION)**

**I. SCHEDULE**

*Note to Project Manager: The following schedule is only a recommended format. Elements of the schedule may be combined (e.g., RI and Risk Assessment Work Plans) or modified (e.g., to incorporate phased investigative approaches or operable units). An initial Site Investigation can be added, to confirm that contamination exists above appropriate risk-based screening levels and to help define the scope of future work. In addition, the Project Manager may wish to expand the schedule to include all deliverables specified in this SOW. Project Managers may choose whether or not to include DEQ review time commitments.*

Respondent shall submit for DEQ review and approval Remedial Investigation (RI), Risk Assessment, Interim Removal Measure (IRM) Assessment and Feasibility Study (FS) work plans and reports which address all elements of this Scope of Work (SOW). Elements of the SOW may be addressed by alternative means or by using existing data or information to the extent that the data are applicable, meet the objectives of the RI/FS, and are of acceptable quality and quantity.

All work completed under this Consent Order shall proceed in accordance with the following schedule:

<b>SUBMITTALS</b>	<b>SCHEDULE</b>
<b>RI Proposal</b>	To DEQ within __ days of issuance of this Consent Order.
<b>DEQ Review and Comment</b>	To Respondent within __ days of receipt of RI Proposal.
<b>Draft RI Work Plan</b>	To DEQ within __ days of receipt of DEQ's comments on RI Proposal.
<b>DEQ Review and Comment</b>	To Respondent within __ days of receipt of draft RI Work Plan.
<b>Final RI Work Plan</b>	To DEQ within __ days of receipt of DEQ's comments on draft RI Work Plan.
<b>Initiation of RI</b>	To be specified in Project Management section of RI Work Plan.

The schedule for additional deliverables specified in this SOW (e.g. Risk Assessment Work Plan, Interim Removal Measure Assessment Work Plan, Feasibility Study Work Plan, Remedial Investigation Report, Risk Assessment Report, Interim Removal Measure Assessment Report and Feasibility Study Report) should be specified in the Project Management Plan section of the RI Work Plan.

Respondent, as necessary to reflect or incorporate newly discovered information and/or environmental conditions, may amend all work plans. Additional work plans and work plan amendments are subject to DEQ review and approval and will be processed according to schedules negotiated between the parties at the time of each phase change or task addition. Respondent shall initiate and complete work according to the schedule specified in the applicable approved work plan or amendment.

**II. OBJECTIVES**

- A. Work performed under this Consent Order shall complement and incorporate existing site information with the following overall objectives:
  1. Identify the hazardous substances, which have been released to the environment.
  2. Determine the nature, extent and distribution of hazardous substances in affected media.
  3. Determine the direction and rate of migration of hazardous substances.
  4. Identify migration pathways and receptors.
  5. Determine the risk to human health and/or the environment.

6. Identify hot spots of contamination.
7. Develop the information necessary to evaluate remedial action alternatives and select a remedial action.
8. Generate or use data of sufficient quality for site characterization, risk assessment, and the subsequent analysis and selection of remedial alternatives.

*Note to Project Manager: The following section is optional. If not used, delete "A" in the heading above, delete the indent and align text with the left margin.*

- B. Work performed under this Consent Order shall complement and incorporate existing site information with the following specific objectives:

1. *To be added by project manager as needed.*

### **III. RI PROPOSAL**

The RI Proposal shall briefly discuss Respondent's proposed approach to the RI, addressing soil, groundwater, surface water, sediments, and air. The proposal will provide the framework for the RI Work Plan and shall include at a minimum, a summary of data collected to date, a conceptual site model (including a conceptual site hydrogeologic model), a description of RI goals and objectives and an estimated schedule for completion of the RI.

### **IV. REMEDIAL INVESTIGATION WORK PLAN**

The work plan shall be developed in accordance with applicable Oregon Administrative Rules (OAR 340-122-0010 through -0115), DEQ guidance and, as appropriate, the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive 9355.3-01, 1988. Existing data may be used if it meets data quality objectives for the RI/FS. The submitted work plan shall include, but not be limited to the following items:

#### **A. PROJECT MANAGEMENT**

The RI Work Plan shall include a proposed schedule for submittals and implementation of all proposed activities and phases pertaining to this SOW. This schedule shall specify submittal dates for the draft and final Risk Assessment and Feasibility Study work plans and final and draft Remedial Investigation, Risk Assessment and Feasibility Study reports. It shall also include a description of the personnel (including subcontractors, if known) involved in the project, and their respective roles in the project; and a discussion of how variations from the approved work plan will be managed.

#### **B. SITE DESCRIPTION**

The RI Work Plan shall include a discussion of the current understanding of the physical setting of the site and surrounding area; the site history; hazardous substance and waste management history; and current site conditions.

#### **C. SITE CHARACTERIZATION**

The RI Work Plan shall include a Site Characterization Plan consistent with DEQ guidance and the requirements specified in OAR 340-122-0080, including but not be limited to, characterization of the hazardous substances, characterization of the facility, identification of potential receptors and the collection and evaluation of information relevant to the identification of hot spots of contamination. The Site Characterization Plan shall address the following:

1. **Soils**

Objective: To identify and characterize releases of hazardous substances at or from the facility to soils.

Scope: The plan shall supplement previous soil sampling at the facility. The plan shall address all areas which could potentially have received spills, leaks from tanks or piping, waste treatment or disposal, or contaminated surface water or storm water runoff, and all other areas where soil contamination is known or suspected.

Procedures: The plan shall be designed and conducted to determine the vertical and lateral extent of soil contamination, characterize the site geology, determine the physical and chemical soil characteristics relevant to the RI and FS, evaluate the potential for contaminant migration and gather the information necessary to identify hot spots of contamination. The plan shall include the proposed methodology for characterizing soil.

2. **Groundwater**

Objective: To identify and characterize releases of hazardous substances at or from the facility to groundwater.

Scope: The plan shall supplement previous investigations at the facility, and identify and characterize all past, current and potential releases of hazardous substances to groundwater.

Procedures: The plan shall be designed and conducted to determine the vertical and lateral extent of groundwater contamination; characterize the site hydrogeology, determine the physical and chemical water bearing zone characteristics relevant to the RI and FS. The plan shall evaluate the potential for contaminant migration through groundwater; and gather the information necessary to identify hot spots of contamination. The plan shall include the proposed methodology for characterizing groundwater. Alternative methods for characterizing groundwater should be considered to accelerate the RI. Monitoring wells and other holes must be drilled, constructed and decommissioned in accordance with OAR Chapter 690, Division 240 and DEQ "Ground Water Monitoring Well, Drilling, Construction and Decommissioning" guidelines (1992).

3. **Surface Water and Sediments**

Objective: To identify and characterize releases of hazardous substances at or from the facility to surface water and sediments.

Scope: The plan shall supplement previous investigations at the facility and shall identify and characterize all past, current, and potential impacts to surface waters and sediments.

Procedures: At a minimum, the plan shall delineate past and present surface drainage patterns at the site and evaluate whether surface water and sediments may have been impacted by releases of hazardous substances. Unless this evaluation is sufficient to demonstrate that surface water or sediment quality has not been impacted, an appropriate surface water and sediment characterization plan shall be prepared. The plan shall be designed to delineate the nature and extent of contamination, characterize the site hydrology, determine the physical and chemical surface water and sediment characteristics relevant to the RI and FS, evaluate the potential for contaminant migration and gather the information necessary to identify hot spots of contamination. The plan shall include the proposed methodology for characterizing surface water and sediments.

4. **Air**

Objective: To identify and characterize the release of hazardous substances to the air, from soil, surface water, or groundwater contamination at or from the facility.

Scope: The plan shall supplement previous investigations at the facility and shall identify and characterize all past, current and potential releases (e.g., from contaminated soil or groundwater) of hazardous substances to indoor or outdoor air.

Procedures: The plan shall include the proposed methodology for evaluating air emissions and vapor intrusion using appropriate emission calculations and/or a field sampling program. The plan shall be designed to delineate the nature and extent of contamination, characterize the site climatology, determine the physical and chemical air characteristics relevant to the RI and FS, evaluate the potential for contaminant migration and gather the information necessary to identify hot spots of contamination.

5. **Identification of Current and Reasonably Likely Future Land and Water Use**

Objective: To identify current and reasonably likely future land and water uses in the locality of the facility.

Scope: The plan shall be designed to identify current and reasonably likely future land and water uses for the purposes of identifying hot spots of contamination and conducting baseline human health and ecological risk assessments in accordance with OAR 340-122-0080 and DEQ Guidance.

Procedures: The plan shall include the proposed methodology for identifying current and reasonably likely future land and water uses in the locality of the facility.

**D. SAMPLING AND ANALYSIS PLAN (SAP)**

Objective: To adequately document all sampling and analysis procedures.

Scope: In preparation of the SAP, the following guidance documents shall be utilized: Data Quality Objectives Process for Superfund, EPA 540-R-93-071, September, 1993; Test Methods for Evaluating Solid Waste, SW-846; and A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001 (OSWER Directive 9355.0-14), December, 1987. The SAP shall address all topics listed in Land Quality Division Policy #760.000, Quality Assurance Policy.

Procedures: The work plan shall include a Sampling and Analysis Plan (SAP). The SAP shall include quality assurance and quality control (QA/QC) procedures for both field and lab procedures. The SAP shall be sufficiently detailed to function as a manual for field staff.

**E. HEALTH AND SAFETY PLAN (HASP)**

Objective: To establish policies and procedures to protect workers and the public from the potential hazards posed by the hazardous materials at the site.

Scope: The HASP portion of the work plan shall comply with 29 CFR 1910.120 and OAR Chapter 437, Division 2.

Procedures: The HASP shall include a description of risks related to RI activities, protective clothing and equipment, training, monitoring procedures, decontamination procedures and emergency response actions required to safely conduct the work.

**F. MAPS**

The work plan shall include a map or maps of the facility, which clearly shows site topography, on-site structures, waste disposal areas and proposed sampling locations.

**V. RISK ASSESSMENT WORK PLAN**

**A. HUMAN HEALTH RISK ASSESSMENT PLAN**

Objective: To evaluate the collective demographic, geographic, physical, chemical, and biological factors at the site, for the purposes of characterizing current and reasonably likely future risks to

human health as a result of a threatened or actual release(s) of a hazardous substance. To document the magnitude of the potential risk at the site; support risk management decisions; and establish remedial action goals, if necessary.

Scope: The Human Health Risk Assessment shall evaluate risk in the context of current and reasonably likely future land and water uses, and in the absence of any actions to control or mitigate these risks (i.e., under an assumption of no action). The human health risk assessment portion of the work plan shall be developed based on the requirements specified in OAR 340-122-0084; DEQ guidance; and, as appropriate, the Risk Assessment Guidance for Superfund - Human Health Evaluation Manual Part A, United States Environmental Protection Agency (EPA), Interim Final, July 1989, (RAGS-HHEM); Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors", EPA, March 1991, (HHE-SG); and the Exposure Factors Handbook, EPA, 1996. A suggested outline for the human health evaluation is given in Exhibit 9-1 of the RAGS-HHEM. The work plan shall use this outline as a framework for discussing the methodologies and assumptions to be used in assessing the potential human health risks at the site.

Procedure: The work plan shall describe the different tasks involved in preparing the Human Health Risk Assessment. The Human Health Risk Assessment can be completed using either deterministic or probabilistic methodologies. If probabilistic methodologies are to be used, then Respondent shall discuss risk protocol with DEQ before the commencement of a probabilistic risk assessment. If deterministic methodologies will be used, then the Human Health Risk Assessment shall include an estimate of both the central tendency exposure (CTE) and the reasonable maximum exposure (RME) expected to occur under both current and future land use conditions. In general, RME exposures shall be based on the 90th percentile exposure case. Additional guidance on quantifying the RME is given in Chapter 6 of the RAGS-HHEM, SRAGS, and HHE-SG. Quantifying the potential risks associated with the RME shall be the overall goal of the risk assessment.

## **B. ECOLOGICAL RISK ASSESSMENT PLAN**

Objective: To evaluate the collective demographic, geographic, physical, chemical, and biological factors at the site, for the purposes of characterizing current and reasonably likely future risks to the environment as a result of a threatened or actual release(s) of a hazardous substance; document the magnitude of the potential risk at a site; support risk management decisions; and establish remedial action goals, if necessary.

Scope: The Ecological Risk Assessment shall evaluate risk in the context of current and reasonably likely future land and water uses in the absence of any actions to control or mitigate these risks (i.e., under an assumption of no action). The Ecological Risk Assessment shall use a tiered approach (with four levels) to produce a focused and cost-effective assessment of risk. The Ecological Risk Assessment Work Plan shall be developed based on the requirements specified in OAR 340-122-0084; DEQ guidance; and, as appropriate, Proposed Guidelines for Ecological Risk Assessment, EPA, September 1996; Framework for Ecological Risk Assessment, EPA, February 1992; and Risk Assessment Guidance for Superfund, Volume II, Environmental Evaluation Manual, Interim Final, EPA, March 1989 (RAGS-EEM).

Procedure: The plan shall describe the different tasks involved in preparing the ecological risk assessment. Ecological risk assessments may include a Level I Scoping plan; a Level II Screening plan; and a Level III Baseline plan or Level IV Field Baseline plan. The Level III and Level IV baseline plans shall include an exposure analysis, an ecological response analysis, a risk characterization and an uncertainty analysis as required by OAR 340-122-0084(3). The ecological risk assessment can be completed using either deterministic or probabilistic methodologies. If probabilistic methodologies are to be used, then Respondent shall discuss risk protocol with DEQ before the commencement of a probabilistic risk assessment. If deterministic methodologies are to be used, then the ecological risk assessment shall include an estimate of both the central tendency exposure (CTE) and the reasonable maximum exposure (RME) expected to occur. Estimating the potential risks associated with the RME shall be the overall goal of the risk assessment.

## **VI. INTERIM REMOVAL MEASURE ASSESSMENT AND FEASIBILITY STUDY WORK PLANS**

Objectives: To develop the information required to evaluate the feasibility of interim removal measures and to identify and evaluate remedial action alternatives and select or approve a final remedial action to be performed at the facility.

Scope: The Interim Removal Measure (IRM) Assessment Work Plan shall identify and evaluate potentially feasible IRMs (e.g., fencing, and other measures to restrict access; soil removal; capping; hydraulic containment; and other risk reduction measures) that could mitigate immediate threats to human health and safety or the environment and prevent or reduce further contaminant migration.

Scope: The Feasibility Study (FS) shall be developed in accordance with the requirements specified in OAR 340-122-0085 and 0090, DEQ guidance and, as appropriate, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive 9355.3-01, 1988. The FS shall develop and evaluate an appropriate range of alternatives. The FS work plan may be developed in parallel with Remedial Investigation (RI) activities or may be developed and submitted separately after commencement of RI activities.

Procedures: A work plan shall be submitted which shall include, but not be limited to, the following:

### **A. PRELIMINARY EVALUATION OF REMEDIAL INVESTIGATION DATA**

The work plans for the IRM Assessment and FS shall include a preliminary evaluation of data collected during the RI. The evaluation shall be used to identify potential IRMs, preliminary remedial alternatives and additional data needs.

### **B. DESCRIPTION OF IRM ASSESSMENT PROCESS**

The IRM Assessment Work Plan shall include a description of how potential IRMs will be identified, screened, and evaluated in detail, including discussions of the feasibility and costs of each potential IRM identified, and a schedule for implementation.

### **C. DESCRIPTION OF FS EVALUATION PROCESS**

The FS Work Plan shall include a description of how remedial alternatives will be developed, screened, and evaluated in detail, including identification of hot spots of contamination, evaluation of treatment and/or excavation and off-site disposal of hot spots of contamination, and completion of a residual risk assessment.

## **VII. REPORTS**

### **A. MONTHLY REPORTS**

[NO. OF] copies of the Monthly Reports shall be submitted to DEQ by the 10th day of the month following the reporting period. The monthly reports shall summarize activities performed, data results collected or received and problems encountered or resolved during the past month, and activities planned for the upcoming two months.

*Note to Project Managers: In many instances, quarterly reports may be appropriate.*

### **B. REMEDIAL INVESTIGATION REPORT**

The Remedial Investigation Report shall follow the outline in Table 3-13 (page 3-30 - 3-31) in the CERCLA RI/FS guidance, as applicable, and address the items listed below:

1. **Executive Summary.**
2. **Introduction.**

3. **Site Background.** A discussion and supporting maps of facility operations, site description, site setting, and current and reasonably likely future land and water uses.
4. **Study Area Investigation.** A discussion of the investigative procedures and results for soil, groundwater, surface water, sediments and air.
5. **Summary and Conclusions.** A discussion of the nature, extent, distribution and environmental fate and transport of contaminants in soil, groundwater, surface water, sediments and air.
6. **Appendices.** Detailed information supporting the results of the Remedial Investigation shall be submitted in the Appendices of the report.

#### **C. RISK ASSESSMENT REPORT**

##### **1. Human Health Risk Assessment Report**

The results of the human health risk assessment should follow the outline suggested by the RAGS-HHEM (see Exhibit 9-1 of the RAGS-HHEM). Justification for not following the outline shall be provided in the work plan.

The main sections of the Human Health Risk Assessment Report shall include the following:

- i. Introduction
- ii. Chemicals of Concern
- iii. Exposure Assessment
- iv. Toxicity Assessment
- v. Risk Characterization
- vi. Uncertainty analysis

##### **2. Ecological Risk Assessment Report**

The main sections of the Ecological Risk Assessment Report shall include the following:

- i. Problem Formulation
- ii. Exposure analysis
- iii. Ecological response analysis
- iv. Risk characterization
- v. Uncertainty analysis

#### **D. INTERIM REMOVAL MEASURE ASSESSMENT REPORT**

The results of the Interim Removal Measure Assessment shall be submitted to DEQ in a report, which includes the identification and screening of general response actions and technologies, and the development and detailed evaluation of a representative number of potential IRMs. For each alternative, the report shall discuss its technical and administrative feasibility, its advantages and disadvantages, its estimated construction/implementation time, its operational and maintenance (O&M) requirements (including monitoring activities), and its associated capital and O&M costs. The report shall also include Respondent's conclusions and recommendations.

#### **E. FEASIBILITY STUDY REPORT**

The results of the Feasibility Study (FS) shall be submitted to DEQ in a report, which at a minimum includes a full evaluation of remedial action alternatives. The FS shall provide a workable number of alternatives, which achieve the remedial action objectives and are protective of public health, safety and welfare, and the environment.

The results of the FS shall comply with OAR Chapter 340, Division 122, DEQ Guidance, and, as appropriate, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA OSWER Directive 9355.3-01, 1988. The results of the feasibility shall follow the outline suggested in Table 6-5 (Page 6-15) of the CERCLA RI/FS guidance.

The main sections of the FS Report shall include the following:

1. **Introduction**
2. **Identification of Hot Spots of Contamination.**
3. **Identification of Areas or Volumes of Media which Require Remedial Action.**  
Identify areas or volumes of media which exceed the acceptable risk level, and areas or volumes of media which have been identified as hot spots of contamination.
4. **Development of Remedial Action Objectives.** Develop and discuss the remedial action objectives (RAOs) that meet the standards in OAR 340-122-0040.
5. **Identification and Screening of Remedial Technologies.** Identify potential containment, treatment, and removal technologies and eliminate (screen) those technologies that cannot be implemented at the site.
6. **Development and Screening of Preliminary Remedial Action Alternatives.** Develop a range of preliminary remedial action alternatives acceptable to DEQ that are protective of public health, safety and welfare, and the environment. Retain the “No Action” alternative for comparison.
7. **Detailed Analysis of Remedial Action Alternatives.** Analyze remedial action alternatives in detail in accordance with OAR 340-122-0085 and 0090.
8. **Comparative Analysis of Remedial Action Alternatives.** Compare and rank the remedial action alternatives based on the analysis in #7 above.
9. **Recommended Remedial Action Alternative.** Recommend a remedial action alternative based on the comparative analysis of remedial action alternatives. Perform a residual risk assessment on the recommended alternative in accordance with OAR 340-122-0084(4). Include the information required by OAR 340-122-0085(8).

#### **F. REPORT DISTRIBUTION**

1. [NO. OF] bound and one (1) unbound copy(s) of all work plans and reports shall be submitted to DEQ.
2. DEQ requests that all copies be duplex printed on recycled paper.
3. Electronic copies of work plans and reports, including all data and figures, if requested, shall be submitted in Microsoft Office or ArcView compatible format. All photographs must be submitted in both hard copy and electronic file formats.